

DIVISION OF LABORATORIES AND RESEARCH
N. Y. STATE DEPARTMENT OF HEALTH

- Animal Experimentation -

Walter B. Cannon

Late George Higginson Professor of Physiology
Harvard University Medical School, Boston, Mass.

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A LIST OF REFERENCES

(With Excerpts)

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Allen, Frederick M., Professor of Internal Medicine, New York Polyclinic
Hospital and Medical School

War and the antivivisection racket.

Hygeia, June, 1943, 21, 412-415; July, 1943, 21, 504-505; 532-534; 535

"...

"In summary, the conquest of infection and notable advances in combating hemorrhage and shock have been accomplished through animal experimentation and could not have been accomplished in any other way. No army could or would take the field today without making use of the knowledge and the curative agents derived from laboratory animals. The progress which can be measured from the time of each war to the next is dramatic and undeniable in terms of life and suffering saved.

"...Ordinarily the public would take little heed, or be deceived with the usual ease. But now, when so many persons have a direct and vital interest in some soldier or sailor at the front and when so many others are furnishing blood plasma to save wounded men by a method derived directly from experiments on dogs, they feel a keener appreciation, a more direct responsibility and a more urgent desire for further advances in treatment."

American College of Surgeons, Board of Regents, 40 East Erie Street,
Chicago, Illinois

Animal experimentation: its importance and value to scientific medicine. 48p.

Series of articles by recognized authorities, among them:

Banting, Sir Frederick G., Department of Medical Research,
Banting Institute, University of Toronto, Toronto.

"I may say that I believe in animal experimentation because I think human life is more valuable than animal life. Medical science cannot advance without the use of animals. ..."

Cannon, Walter B., George Higginson Professor of Physiology,
Harvard University Medical School, Boston, Mass.

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American College of Surgeons, Board of Regents (cont'd.)

Crile, George, Director, Cleveland Clinic, Cleveland, Ohio.

"...The principles of surgery and preventive medicine which are applied to man are as effective when applied to dogs and cats and horses by the veterinarian. Moreover, the dog has benefited from the use of other animals in the experimental laboratory where a vastly larger number of rats, mice, guinea pigs, and rabbits are used; the number of these animals used, in proportion to the number of dogs, being certainly not less than 1,000 to 1.

"Neither man himself nor any one species of animal is entitled to be excluded from taking his part in the drama of life. Certainly our guest animal, the dog, should carry a little of the burden."

Davis, D. J., Dean, University of Illinois College of Medicine,
Chicago, Illinois

"...Every one should be familiar with the history of animal plagues which in every age has led to untold suffering and death to countless millions of animals both wild and domestic. Often these widespread epidemic diseases involved human beings. They are referred to in the Bible and in the annals of every people. Such diseases exist today and many are readily transferred to humans. Examples are anthrax, glanders, dog distemper, tuberculosis, hydrophobia or rabies, and undulant fever. At the present time in all civilized countries these diseases are now either under control or are being rapidly eradicated. Every honest person, even to some degree familiar with the facts, will admit that this control of the great animal and human epidemics with the accompanying alleviation of pain, suffering, and misery in both animals and man is due in the main to knowledge acquired by the study and experiments on animals by both medical men and veterinarians. ..."

Moorhead, Louis D., Dean, Loyola University School of Medicine,
Chicago, Illinois

"The use of animals is essential in the teaching of physiology and of surgery. In these subjects, even more than in chemistry or physics, the student must learn in part by doing work with his own hands. If a young surgeon were about to perform on my body his first major operation on a human being, I should be glad to know that he had passed a written examination on his surgery text. I should also be glad to know that he had watched experienced surgeons at work, had even held retractors and applied sponges for them. But I should be still further comforted by an assurance that he had himself successfully carried out, upon dogs, operations similar to that for which I was being prepared. ..."

Rous, Peyton, The Rockefeller Institute for Medical Research,
New York City

"...living creatures still suffer too much and die too young. Is it not common sense to go on trying to help them by a method which has already yielded such gains? And common sense to utilize for the purpose the kind of animal required for new discoveries? No one wishes to experiment upon the dog. But the dog is more than man's friend. He is man's near neighbor physically. In his build, his diet, and the changes sickness produces in him he resembles man

American College of Surgeons, Board of Regents (cont'd.)

Rous, Peyton, (cont'd.)

far more than do the other available creatures. Scientists could not have found out about some diseases, human and animal, had he not been experimented upon; nor can they do so in the future without him."

Bauer, William W., Director, Bureau of Health Education,
American Medical Association, Chicago, Illinois
Sabotage of science.

Hygeia, Sept. 1941, 12, 682-683.

"... "The anti-vivisectionists contend that the use of animals for experimental purposes in the laboratory is cruel and inhuman, and that it has not contributed anything to medical progress which could not equally well have been ascertained through observation on human beings. Sometimes they insist that the final experiment must always be on the human being, and therefore all experiments on animals are useless anyway. ...

"... Where does the cruelty lie - in the scientists who humanely use animals to end human suffering, or with the people who by stopping animal experimentation would deny humanity an indispensable weapon against the scourges that still beset it?"

Campbell, Gertrude H.

The clubwoman looks at animal experimentation.

Hygeia, Aug. 1934, 12, 687-688.

"...she will appreciate the wisdom and discernment of the late Charles W. Eliot of Harvard when he said, 'The humanity which would prevent human suffering is deeper and truer humanity than the humanity which would save pain and death to animals.' ...

"My only explanation of the attitude of those who are opposed to scientific animal experimentation, and I believe the enlightened clubwoman agrees with me, is this 'They are down on it because they are not up on it.'"

Cannon, Walter B., George Higginson Professor of Physiology,
Emeritus, Harvard University Medical School.

The way of an investigator: a scientist's experiences in medical research.
New York, W. W. Norton and Company, 1945. 229p.

"...Investigators who employ living animals for experimental purposes not only confront more complex problems than do the physicists and the chemists but they also confront a hostile group of zealous opponents. These are the fighting antivivisectionists ..., the success of whose efforts would interfere with the activities of the investigators and might even abolish the means through which their experimental work can arrive at its beneficent consequences. The word 'vivisection' is unfortunate because it has various meanings which are not clearly distinguished. To the antivivisectionists the word too frequently signifies the cutting or dissecting of sentient living animals, bound or otherwise restrained and without anesthesia subjected to the full torture of extensive operations.

Cannon, Walter B., (cont'd.)

The repeated tales of assumed cruelty, the unexplained illustrations of instruments used in laboratory procedures, and the imaginary pictures of sufferings the animals are supposed to endure at the hands of experimenters indicate the hideous significance attached by the zealots to the word 'vivisection.'

"To the medical investigator, on the contrary, the word has quite a different significance. It means, to be sure, operations on living animals but it does not imply attendant pain, any more than does an operation on a living man by a surgeon. And if an animal is anesthetized, then operated upon, and is killed without recovery from anesthesia, clearly the procedure has not involved any pain whatever. ... In medical investigations substances are injected and sometimes diseases are produced; and in surgical research it is occasionally necessary, after a painless operation, to keep the animals alive in order to observe the effects of the procedure. In these instances of inoculation and aseptic operation, the animals may feel ill, as they would with a distemper. The pain of inoculation is trifling; and in the vast majority of operations even on human beings the aseptic healing of wounds, as I can testify from personal experience, causes no considerable discomfort after full recovery from the anesthetic. Were lower animals as sensitive as man, therefore, the pain would not be great, and there are good indications that they are not as sensitive. The sight of an animal contentedly munching its food a short time after an operation is commonplace in laboratory experience. The total amount of pain resulting from animal experimentation is in all antivivisection literature grossly exaggerated."

p.49-50

"...The fundamental mischief of the antivivisectionists in agitating against medical research is...their presentation of a misleading issue. They deny that any utility has come from animal experimentation, they describe the experiments as horrible torturing of dumb brutes, and then they ask if this futile cruelty shall be permitted to go on. If this were the whole and veracious story, few would hesitate on which side to stand. ... But that is not the whole story. Nor is it veracious. ..."

"...investigators are aware of overwhelming evidence that by the experimental use of some animals the chances for life and health of all mankind, and of myriads of lower animals as well, have been enormously amplified. All that the uninstructed need to is to read what is known regarding the direct and practical relation of animal experiments to the effective treatment of diphtheria and tetanus, to meningitis, rabies, and smallpox, to dysentery, cholera and typhoid fever, to bubonic plague, tuberculosis and syphilis, to the disturbances of internal secretions, to diabetes and pernicious anemia, to the action of drugs, to the advancement of surgical technique, to childbirth, to hygiene and preventive medicine - in order to learn of the incomparable service which animals in the laboratories have rendered for their fellow creatures. ..."

p.155-156

Carlson, Anton J., Professor of Physiology, University of Chicago.
Animal experimentation in biology and medicine.
Science, 1938, 88, 245-250.

(See also his article, "Experimentation and medicine. Man's debt to the animal world." Hygeia, Feb. 1935, 13, 126-128)

"Free and intelligent experiments on animals during the last three hundred

Carlson, Anton J., (cont'd.)

years have been the greatest factor in our present achievement in knowledge of the nature of life and control of disease. ...Experimentation on animals is essential for the practical application of the great deal of present medical knowledge in the prevention or cure of disease. Animals produce antitoxins for us; they are essential in the discovery and standardizing of new remedies. They are necessary for the diagnosis of some forms of tuberculosis. They are of great service in some aspects of human pregnancy. The modern story of foods, nutrition and the known disorders of nutrition would be largely gaps and guesses, except for the services of the rat, the pigeon and the dog. ...Intelligent and humane use of all species of animals will be necessary on the road to a fuller understanding and control of heredity, growth, cancer, immunity, colds, pneumonia, nervous, glandular, nutritional and mental disorders. Furthermore, the use of animals is of continuous and increasing importance in the training of the doctor and the biologist of the future. ...If the society of tomorrow needs the services of doctors and biologists, common sense seems to say that their training is a matter of importance, a training in nature as well as in books. That means, we need animals in the training of doctors and biologists, and animals can be so used, and are so used, without cruelty. ..."

"The liberal writer, Howard Vincent O'Brien, said recently;

'Life is an endless battle between sense and sentiment.

'If the antivivisectionists were content to preach their sentiment, sense would have little to fear from them. Unfortunately for sense, this form of sentiment commands large resources in money and is able to exert pressure on public opinion. ...I can only hope that such persons never have to see a child trying to breathe through a diphtheritic throat. ...

'Those who raise their cry of cruelty to animals seem to center their pathos on the dog. They are silent about the sufferings of the cat, the monkey, the guinea pig and the mouse; and, while they respond quickly to individual instances of human distress, they are fatalistic to the social injustice which causes them. It seems to me...that attacks on cruelty should begin with the sort which keeps humans cold, hungry and idle, and which sacrifices them in the senseless hecatomb of war. ..."

Crowell, Bowman C., Associate Director, American College of Surgeons,
and Director, Clinical Research, Chicago, Illinois
Health benefits from animal experimentation.

Issued by American College of Surgeons, 40 East Erie St., Chicago, Ill., 7p.

"It is interesting to stand in the concourse of one of our large railway stations and watch the people who pass through it. How few bowed legs we see and how few are pock-marked! What clear eyes they all have! How few hunchbacks there are, and how few show disfiguring scars on the neck! Compared with conditions in this country at the turn of the last century, and in some foreign countries at the present time, this picture indicates an immense progress in the control of rickets, smallpox, trachoma, and tuberculosis of the spine and of the glands of the neck.

Crowell, Bowman C., (cont'd.)

"Each of us demands that our family physician shall be able to prevent sickness and, at any cost, shall do the most possible for us when we do get sick. It is impossible for him to take preventive or curative measures, surgical or otherwise, without using knowledge that has been gained from work on lower animals - mice, rats, guinea-pigs, rabbits, dogs, monkeys, birds, horses, cows, and other animals. The drugs and other remedial agents that he uses are tested and standardized on animals. Many of his diagnostic tests are performed on animals. His surgical technique has been perfected on them. New knowledge of practical value in health as well as in disease comes from them and must continue to come from them. Many of the protective and curative agents are manufactured within their bodies. Moreover, the benefit to animals themselves has been as great as has that to human beings. Epizootic diseases have been controlled, and preventive and curative measures have saved the lives of millions of animals. ..."

Cutler, Elliott C., Mosely Professor of Surgery, Harvard School of Medicine, Boston, Massachusetts

Public opinion and animal experimentation.

Surgery, 1940, 8, 182-187.

"... Before the advent of bacteriology, surgical operations were attended with almost inevitable sepsis, so that hospitals came to be looked upon by suffering human beings as places definitely unhealthful for them to enter. With the coming of the study of bacteria as the cause of infection and with slow and continuous animal investigation, which proved not only how bacteria cause disease in living matter but how the bacteria can be killed off so that infection is not passed from individual to individual, came the first steps in modern surgical advance. On these animal investigations are securely erected our present methods of sterilization. ..."

"We should not have known how to sterilize all the materials used in operating rooms today, unless we had found out upon animals what organisms did when they entered a living body. Thus, every person today whose life has been saved or made more comfortable through a surgical operation owes a deep debt of gratitude to the animals concerned with this development. ..."

"Not only has man benefited from these experiments, but the animals themselves have benefited. Texas fever, which at one time destroyed a great part of the cattle bound for the meat markets, has now disappeared because Theobald Smith used a few animals in studying the transmission of the disease from steer to steer through a tick. Similarly, hog cholera, which decimated swine, is now under control because of a few animal investigations. The foot and mouth disease, through a similar group of experiments, has practically disappeared from this country. Indeed, experiments made to protect animals have frequently resulted in benefit to man. Thus, the drug which Maurice Hall found would cure hookworm disease in dogs later proved effective in man and alleviated the suffering of millions of our own genus in the South. And what of the beneficial and helpful surgery now performed on horses, cows, and dogs for their own good and comfort? The great good to animals that goes on in the many splendid animal hospitals set up by Humane Societies could not exist unless the role of bacteria in relation to infection had been discovered by animal experiments. Think of the protection to animals given by vaccination for rabies, for horse encephalitis, and for distemper! ..."

Deaver, John B., Surgeon-in-Chief, Lankenau Hospital, Philadelphia, Pa.
Health, science and vivisection.
New England Journal of Medicine, 1930, 203, 613-616.

"...Animal experimentation is so intimately bound up with the economic and social structure of life that it would be impossible merely to make a list of its numerous ramifications. Take only one example, the control of infectious diseases of animals. This has not only spared dumb creatures untold suffering, but has been of inestimable value in the life of the farmer, the dairyman and other animal industries. It means reduced losses, increased production, cheaper food and wearing apparel, to say nothing of the saving of human life from...animal infections communicable to human beings ...

"I have no hesitancy in saying that the curriculum of every medical school should, by right, include a course for senior students of operative surgery on animals. This, to my mind, is an essential and proper preparation for the practice of medicine in general and particularly for the student who contemplates shouldering the responsibilities of human surgery. Personally, if I should have to be operated upon, I would prefer the surgeon who has gained his technique by working on a large number of animals than one who has had a limited experience in operations on the human subject. ...

"Of what achievements can the enemies of experimental investigation boast? Have their efforts saved any lives, banished or reduced any disease, added to the progress of commerce and industry? What they have done is to cause hundreds of thousands of dollars to be employed in a campaign of vituperation and misrepresentation that might be put to infinitely better use for the health and happiness of their fellow men. ..."

Dewey, John, Professor of Philosophy, Columbia University, New York City.
The ethics of animal experimentation, from the viewpoint of a philosopher.
Hygeia, Feb. 1931, 9, 116-120.

"...Scientific inquiry has been the chief instrumentality in bringing man from barbarism to civilization, from darkness to light, while it has incurred, at every step, determined opposition from the powers of ignorance, misunderstanding and jealousy. ...

"It is also a fair requirement that some kind of perspective and proportion shall be maintained in moral judgments. Doubtless more suffering is inflicted upon animals in a single day in a single abattoir in some one city of our country than in the year, or years, in all the scientific and medical laboratories of all the United States. Do they come into court with clean hands who complacently, without protest and without effort to remedy or to alleviate existing evils, daily satisfy their own physical appetites at the cost of the death of animals after suffering, in order then to turn around and cry out against a relatively insignificant number of deaths occurring, after skilled precautions against suffering, in the cause of advancement of knowledge for the sake of the relief of humanity? Surely, until it is finally decided that the taking of animal life for human food is wrong, there is something morally unsound in any agitation which questions the right to take animal life in the interests of the life and health of men, women and children, especially when infinitely more precautions are used to avoid animal suffering in the latter case than in the former."

Graham, A. Stephens, Associate Professor of Surgery, Medical College of Virginia,
Richmond, Virginia

The role of experiments on animals in the treatment of disease.

American Journal of Surgery, 1932, n.s. 18, 135-145.

"...There have been comparatively few operations performed on the heart; for there have been few surgeons so bold as to adventure on this uncharted sea of great potential dangers. But there has been a definite need for this type of operation. There is a large group of sufferers who are condemned to long years of invalidism, or to early death. Such patients have diseased heart valves which become thickened and distorted by disease, or partially destroyed, the valves leak and eventually the heart reaches the limit of its ability to compensate for an ever increasing disability.

"In the light of the remarkable reconstructions consummated by the surgeon in nearly every part of the body, it is but natural to expect that the time is not far distant when his skill will be applied toward lengthening the span of life in that large group of persons whose heart valves are diseased. These valves have been operated on in the dog and there will be many repetitions of such operations; eventually all doubt will be dispelled and every weak point in the theory of the procedure will be covered with sound experimental reassurance; then man will profit from these long years of cautious testing and retesting."

Hall, Maurice C., U.S. Public Health Service

The prevention of cruelty and the work of a great humane society.

Scientific Monthly, 1932, 34, 211-221.

"...Foremost of those who would close the search for knowledge and write 'Finis' to the rapidly growing book of medical science is the group of men and women who call themselves antivivisectionists. About a nucleus of paid propagandists clusters this medley of kindly but poorly informed humanitarians, enemies of all medical science, sadists who conceal under an outward love of animals a cruelty towards mankind, persons who boldly flaunt the conviction that they would rather see a child die of disease than have a guinea-pig subjected to experiment to find a way to save the child, persons who admit that they would rather see a million dogs die from parasitism at nature's hands than have a hundred dogs subjected to studies on that parasitism by scientists to save the million dogs.

...Year after year these persons hear the evidence of the benefits to mankind and to animals from experiments on animals and, year after year, with characteristic intellectual dishonesty, they reiterate the falsehood that no benefits ever came from experiments on animals. It means nothing to them that the disease and death which man deliberately inflicts on a hundred guinea-pigs or dogs to-day save the health and lives of a million persons or dogs or cows next year or in the next ten years. ..."

Heinen, Rev. Victor

Be kind to what animals?

Reprinted in Hygeia, March 1937, 15, 210-212, from "Morning Star," a periodical published by the students of Conception College, Conception, Missouri.

"'Be kind to animals!'" That phrase is familiar as the slogan of a number of societies, whose aim is to prevent cruelty of one form or another to the dumb brute. This same phrase might equally serve as the motto of a group of prominent men whose activities some of these very societies are trying to condemn. These

Heinen, Rev. Victor (cont'd.)

benefactors of humanity are the research scientists, or as they are referred to - contemptuously as a rule - the vivisectionists.

"Most assuredly the vivisectionists' slogan could and really should be 'Be kind to animals.' That phrase expresses exactly what the physician in training is trying his best to practice. He is showing kindness to man. Man is an animal, the noblest - for he is the rational animal ...

"The conclusion must be that opposition to medical research because of misplaced sentiment and irrational sympathy is not facing the facts of the case and acting upon them in a rational way. Reason tells us that the suffering of humanity, especially of our children, is the correct sphere for rational sympathy..."

Hirschfelder, Arthur D., Professor of Pharmacology and Therapeutics,
University of Minnesota Medical School, Minneapolis, Minn.

The role of experiments on animals in the treatment of disease.
Modern pharmacology.

American Journal of Surgery, 1932, n.s. 17, 452-457.

"...in order to cure a disease, relieve a symptom or allay pain, each 'drug' must produce a definite kind of change in the workings of the body. ...

"Not only is experimentation upon animals necessary for the discovery of new drugs, but the laws of the United States require that every sample of certain important well-known drugs must be tested out on animals in order to determine that it is strong enough to accomplish what is expected of it and safe enough to be used upon human beings. ...

"Experiments upon animals have taught us the exact causes of many of the diseases that affect our health. It is by experiments upon animals that the remedies for these diseases have been found and made safe and effective; and it is only by experiments upon animals that the diseases, for which no specific remedies have yet been found, will probably be conquered in the future."

Ivy, A. C., Nathan Smith Davis Professor of Physiology and Pharmacology,
Northwestern University Medical School, Chicago, Illinois

Some contributions by animals to human health.

California and Western Medicine, 1934, 41, 247-250.

"...Animal experimentation is not only humane, but is a manifestation of the highest type of humanity in that it prevents unnecessary and random experimentation on man. ..."

Presents explanatory legends used in one of the exhibits of Northwestern University at the Century of Progress Fair in Chicago.

Kilduffe, Robert A., Director of Laboratories, Atlantic City Hospital,
Atlantic City, N. J.

What are the facts? A discussion of medical research.

American Journal of Nursing, 1935, 35, 40-44.

"...The attack upon vivisection is based in general upon two main

Kilduffe, Robert A. (cont'd.)

propositions: first, that it involves unnecessary and unjustified brutality and untold suffering on the part of the animals used for experiment; and, second, that nothing of any benefit to humanity has been or ever can be achieved by animal experimentation. Now, what are the facts? ...

"The scientific investigator differs from other men only in his interest in the problems concerned with the management and control of the diseases which afflict humanity, and in the indefatigable and unselfish labor he devotes to their solution.

"The scientific laboratory has no room for the individual careless of suffering and heedless how he produces it. This is not a matter of ethics, of morality, but a matter of sane, simple, common sense.

"Animal experimentation often involves expense and always has a definite end in view - to establish some fact or to secure information. And how is it possible to carry out a delicate procedure or experiment upon a violently struggling animal, how is it possible to interpret or evaluate its results in an animal frantic with agony?

"Any experiment - the rule is absolute - involving pain of appreciable degree is carried out under anesthesia with all the care and precaution which would be used on the human being. Common sense alone makes this essential, for how may a new surgical procedure be developed, for example, if its performance is rendered difficult, if not impossible, or its ultimate result ascertained if the animal dies of infection or lack of care during or after the operation? ...

"Not a laboratory animal suffers one hundredth of the pain which is the portion of the wounded duck shot for sport and not found by the hunter; of the real agony consequent upon the various barnyard operations whose sole purpose is to improve the quality or flavor of their meat when sold; of the terror and pain which every day is the commonplace of the slaughter-year; of the agony of the fur-bearing animals trapped for fashion's sake!

"Can it be maintained that no matter how little the suffering entailed by animal experimentation in medical research, animal experimentation cannot be justified because nothing of value to humanity has ever resulted from it? What are the facts? Consider this list comprising (only a few) of the gifts to humanity resulting from medical research.

The discovery and development of antiseptic surgery. Unless first perfected by operations upon animals, many of the surgical procedures now regarded as commonplace would have been impossible as a means of saving human life. Research alone has made possible all abdominal surgery, surgery upon the chest, and all modern surgery of the heart and brain. ...

Research has abolished lockjaw after accidents.

Research has reduced the mortality after compound fractures from two out of three to two or three in a hundred. ...

Research has reduced to a negligible factor the death rate after operations for tumors, hernia, and after amputations.

Kilduffe, Robert A. (cont'd.)

Research has abolished yellow fever, furnished some means for the control of malaria, and reduced the death rate from hydrophobia from 12 per cent to 0.77 per cent of persons bitten.

Research has devised and perfected the method of blood transfusion. ...

Research has laid bare the cause of infantile paralysis and will eventually furnish means for the cure and control of this dread disease. Who, in the midst of an epidemic of this disease, has not wished for some sure and certain means of guarding against it, or, for that matter, would have cared much how it was discovered just so that it was found? From research alone can such a discovery ever come. ...

Research has enormously benefited animals by the discovery of the cause and, in many instances, the means to attacking and preventing many of the diseases to which they are subject. ...

In research alone lies the only hope of discovery of the cause of cancer. ...

Research alone made possible the development of reparative, plastic surgery through which thousands of ...maimed and wounded... are enabled to mingle again with their fellow men. ...

"The whole subject was put in a nutshell by Dr. S. Weir Mitchell years ago in a remark as applicable now as then and, indeed, eternal in its unanswerable truth. Visiting an antivivisection exhibition in Philadelphia, he said to one of the guides:

'Your exhibition is not complete. You should place here a dead baby and there a dead guinea pig with the motto:
'Choose between them.'"

Kolmer, John A., Professor of Medicine, Temple University, Philadelphia, Penna.

What science owes to animals.

Hygeia, Nov. 1928, 6, 618-622.

"...Without animal experimentation the discoveries upon which this division of therapeutic science (treatment of infectious diseases by means of vaccines and serums) is based could never have been made and without it biologic therapy would be so badly handicapped that it would practically cease. Animal experimentation is therefore inseparably associated with the maintenance of biologic therapy and its value in this connection is the value of biologic therapy itself in the prevention, diagnosis and treatment of disease. This refers not only to the infectious disorders of human beings but likewise to many diseases afflicting horses, cattle, dogs, sheep and other of the lower animals, for it must not be forgotten that the lower animals were early and directly benefited by a practical application of the knowledge gained from their use in research. ..."

Kretschmer, Herman, President of the American Medical Association.

Animal experimentation.

Hygeia, Aug. 1945, 23, 573.

"...Responsible citizens in every community should join in a well organized

Kretschmer, Herman, (cont'd.)

program to enlighten the public on the issues in vivisection. Then the marvelous growth of medical science may continue to benefit mankind without being hampered by legislation or false and dishonest propaganda.

"What are some of the benefits of animal experimentation to mankind and animals?

1. Animal experimentation has made it possible to develop the entire field of physiology on a sound foundation, both in health and disease, so that we have a better understanding of every organ in the body.
2. Advances in surgical technic have been made possible by animal experimentation. Surgical operations on the intestines, nerves, tendons and blood vessels, transplantations of bone, cartilage and entire organs are the result of animal experimentation.
3. The standardization of various drugs is directly dependent on the use of animals. New remedies, such as the various sulfa compounds and penicillin, are tested out on animals to determine their potency, their actions and effects.
4. Animals are needed to standardize the vaccines, anti-toxins and serums that are used in the prevention and treatment of infectious diseases such as diphtheria, yellow fever, cholera, typhoid and many others.
5. I should like to mention some of the advantages that have accrued to animals: Animals have been protected by vaccination for rabies, for horse encephalitis, distemper, bovine tuberculosis, hog cholera, foot and mouth disease, hookworm disease and many others.
6. The role of bacteria in the cause of the infectious diseases and the methods of preventing these diseases have been the result of animal experimentation. As a result many years have been added to man's life span.
7. Surgical sepsis and antisepsis. If we had not discovered on animals what bacteria did when they entered the body, which discovery led to the practice of sterilizing all materials used in an operating room, our operative mortality would still be high in spite of good surgical technics.
8. Our knowledge of the role that vitamins and hormones play in our life was enhanced by animal investigations.
9. The study of infantile paralysis with its many crippling after-effects requires the use of animals to further research in this field. The monkey has been invaluable in study of the various phases of this dreadful disease.
10. Experiments on animals, particularly mice, have added to our knowledge of cancer and other malignant tumors.

Kretschmer, Herman (cont'd.)

11. Monkeys, dogs, rats and chickens have been used to study malaria and antimalarial drugs.
12. Without the use of animals many of the splendid results achieved in the treatment of casualties in this war would not have been possible. Many of these problems were first studied in animals, including the treatment of burns, the effects of gas poisoning and the treatment of shock.
13. Great progress has been made in the field of anesthesiology, most of it based on animal experimentation. ...As a result of this work, ethylene as an anesthetic agent was put on a firm basis.

"Animals in laboratories and medical schools are given the same care as that given a patient. It is only common sense that if such experiments were not carried out carefully, the effects and results could not be measured. ...The infliction of pain is never deliberately practiced by scientific men - they are interested in preventing pain, in man and animal alike."

Lambert, Samuel W., Emeritus dean, College of Physicians and Surgeons, Columbia University, New York City.

The ethics of vivisection.

New York State Journal of Medicine, 1935, 35, 592-594.

"...Yes, the dog is the friend of man, and the human experimenter is the friend of the dog, and has included rabies and distemper in his curative investigations. There are special reasons why the dog cannot be spared. The dog is omnivorous but largely carnivorous, as is man, and his internal anatomy especially of the liver, gastro-intestinal tract, pancreas, and kidneys, is akin to that of man. The dog, as no other animal could, has contributed very materially to the control of diabetes and of pernicious anemia.

"The general run of mankind takes but little real interest in dogs and cats but uses them as puppies and kittens for the amusement of their children, particularly during a summer vacation, and then in its fickleness turns the poor beasts loose in a hard world to make their own living and wander as vagrants through the outskirts of our cities until picked up by the benevolence of the local associations for the prevention of cruelty to animals. In every year in New York, for instance, over 70,000 dogs and cats are rescued from the life of a friendless hobo, and mercifully killed without giving these animals an opportunity to die equally as mercifully for the advantage of the rest of their own race, and for the protection from disease of their only natural friends: the race of Man..."

Animal experimentation: is it essential to the progress of medicine.
Life, October 24, 1938.

"... On the following pages you will see some examples of animal research which support LIFE'S conclusions that:

1. Medicine's tremendous progress during the past 300 years would have been impossible without animal experimentation.

Animal experimentation (cont'd.)

2. Millions of persons would die in pain every year were it not for discoveries resulting from vivisection.
3. The major modern diseases can be cured only if scientists are allowed freedom in their research.
4. A ban on animal experimentation would force surgeons to learn their art on living men and women. ..."

Lyon, E. P.

An appeal to all citizens: to prevent further weakening of health laws and hampering of research.

Hygeia, April, 1928, 6, 197-199.

"...This article is an appeal to citizens to inform themselves as to what medical science really is; to recognize that it is one science and that sanitation is only a part of it - in fact a resultant method rather than a fundamental principle. It is an appeal to citizens to realize that the campaign against medical science is dangerous to society. It is an appeal to citizens to enter the ranks stoutly to fight for freedom of research and for the free application of known facts of science for the protection of society and the elimination of disease."

The Medical Society of the County of Erie, Inc., and the Buffalo Academy of Medicine
Anti-vivisection menace grows!

Erie County Medical Bulletin, July 1945, 22, 5-6.

"...A recent issue of The American Weekly, a nationwide publication controlled by the Hearst machine, carried an inflammatory anti-vivisection article captioned "Animal torture worthless to science." A. Dr. Arthur V. Allen of Chicago was named as the author. This sensationally-phrased 'indictment' of animal experimentation was read by millions of persons. It contained the appalling statement that 'the great medical victories have been won by studying diseases where they should be studied - in those whom it attacks and kills.' In other words, the anti-vivisectionists have become advocates of HUMAN vivisection. They say: Try a new remedy or method or operation and try it first on MAN. God forbid!

"It is difficult to discuss with calmness this American Weekly article. The assertion of opponents of vivisection, that knowledge obtained from animal experimentation, and which could be obtained in no other way, has been of little or no benefit to mankind can be referred only to gross ignorance or wilful misrepresentation. Experimentation upon the lower animals is an absolutely indispensable and the most important method of investigation of the properties of living organisms. Mortality rates show it has been useful, and surgery would be impossible without practice on animals. Anesthetics are habitually administered to animals subjected to painful research, and the charge that physicians and others engaged in investigations, having for their object the mitigation of human suffering, are less humane than the members of societies formed for the prevention of cruelty to dumb creatures is, of course, something no responsible person believes. ...

"It is a rule of law that the personal interest of the witness must be considered when giving weight to testimony. And the fact cannot be ignored that many leaders of the anti-vivisection movement derive their livelihood by campaigning

The Medical Society of the County of Erie, Inc. (cont'd.)

against animal experimentation. To quote the late Dr. Will Mayo: 'Many of those persons who carry on the propaganda (against animal research) do not necessarily believe in it themselves, but they are trustees of funds left by the dead to carry on the work of what has proved to be a destructive program. The development of propaganda against animal experimentation supported by such funds illustrates the danger which results when persons getting along in years attempt to project such wisdom as they may have, or think they may have, into the affairs of future generations.'

The Medical Society of the State of New York.

Why animal experimentation is necessary for the general welfare.

Published by the Society, 1933. 13p.

"The health of the citizens of New York State is vitally involved in the issue here considered, that of whether vivisection shall be permitted in order to learn about the cause and cure of disease. In every recent year one or more bills have been introduced into the legislature of the State by persons whose avowed aim is to hamper or prevent experimentation upon animals. The sponsors of these bills have worked persistently for them, and it is plain that they will continue their activities in the future. These 'antivivisectionists' claim that medical research, as carried out by the use of animals, is both useless and cruel, and they act upon this belief.

"...There are two ways of finding out whether experimentation upon animals is justified as a means of learning how to prevent pain and disease and premature death. One is to become a student of what the method has yielded already to mankind and to animals. Few people have time for such study. The other way to become informed is to obtain the judgment of qualified persons. There are certain human beings who can be considered as qualified to offer their views because of their learning, their breadth of vision, their unimpeachable character, and their services to humanity. If we are wise, it is from such authorities that we will seek information. ... All the really eminent people of today who bear responsibility for the health of the public or of animals are convinced that such experimentation has not only yielded knowledge which has brought great relief from suffering and helped to prolong life, but that it is indispensable to the further conquest of disease. ...

"The existing law of New York State permits animal experiments to be performed only under the authority of the faculty of some regularly incorporated medical college or university of the State and in certain other legally authorized institutions. This law has been so drawn that experimenters guilty of cruelty to animals can be successfully prosecuted, as a test case has shown. Many years ago a code of rules for the conduct of experiments was voluntarily drawn up and adopted by laboratory workers.

"Within the last fifty years, and chiefly through experiments upon living animals, medicine and surgery have made more progress than during all the preceding ages. Some diseases that formerly constituted a grave menace in New York State are now rarely seen, others have been brought so completely under control that only simple measures are needed to cope with them or escape them; and this applies not only to human diseases, but to those of animals. Physicians are under an obligation to make carefully planned investigations upon animals as the alternative to random efforts to combat those ills of human beings and of animals themselves,

The Medical Society of the State of New York. (cont'd.)

which are as yet imperfectly understood or controlled. Their work should not be hampered."

(Pamphlet includes statements about animal experimentation by persons well known to citizens of New York State)

Mendel, Lafayette B., Sterling Professor of Physiological Chemistry,
Yale University
Scientific experiment and medicine.
Science, 1932, 76, 393-400.

"Modern medicine presents many aspects. Its fields of influence and interest have expanded into a mighty domain. ... The varied activities therein now awaken the concern not only of the practitioner but also of the layman. Public health and preventive medicine have become problems for the state as well as the individual citizen. ...

"You are well aware that opposition to the use of animals for scientific purposes is voiced in some quarters. ... this opposition sometimes wilfully denies the value of animal experimentation in scientific progress; it sometimes assumes the extreme and ethically indefensible attitude of denying the right of man to use animals at all as experimental objects; and it has as its practical aim the establishment of legal restrictions against the practice. ... The study of the history of medicine... must have developed... the inescapable conviction that the investigation of the physical processes alike in the healthy and the diseased body - the fundament of scientific medicine - can not dispense with occasional experiments on the living animal. They are quite as essential as are admittedly the anatomical examination of the organs of the cadaver, the chemical analysis of its tissues or the physical measurements that have biological import.

"In closing, I can not do better than to quote from the significant words of the distinguished biochemist and Nobel laureate, Sir Frederick Gowland Hopkins, president of the Royal Society of Great Britain:

'While scientific advances of every kind tend to react upon and assist medicine it is certain that without experiments upon animals the subject can not properly advance. The necessity continually arises for performing preliminary experiments upon living animals before this or that new piece of knowledge can be applied to the relief of humanity. Much of the new knowledge can, indeed, only be won by means of such experiments. The alternatives are three: ignorance and lack of progress; experiments upon human beings; or experiments upon animals. It should not be difficult to choose among them. The emotions which have led many to reject the last alternative are among those deserving the highest respect. Such emotions, however, have too often been allowed to express themselves in combination with ignorance and with an absence of all sense of proportion. ... The experimentalist has nothing to fear, but everything to gain, from the formation of an informed and healthy public opinion concerning his work.'

Moon, Virgil H., Professor of Pathology, Jefferson Medical College,
Philadelphia, Penna.

What price antivivisection?

Hygeia, Nov. 1932, 10, 999-1003.

..."There exists among scientists a code of ethics which is more binding than legislative enactments. It requires that in all experiments on animals an anesthetic shall be used unless the experiment is of such a nature as to cause less discomfort than would be caused by anesthesia. Physicians apply the same rule when their procedures may be painful to the patient. In more than twenty years of active teaching and research work in medical colleges, I have probably used, or have seen used, animals in every form and for every purpose for which such institutions use them. I have never seen or known of a violation of this code. ...

"Propaganda, like other commodities, may be had for the price. If suitable material is not available, it is easily and promptly fabricated. The supply is suited to the demand. A cause having funds to be expended may lack facts, but it need not lack alleged facts. The literature of the antivivisectionists furnishes manifold illustrations of this. If a prosecutor should bring to trial a defendant charged with petty larceny on evidence such as that which exists concerning the wanton cruelty of scientists, he would be laughed out of court. ..."

Moore, Veranus A., Ithaca, N. Y.

The role of experiments on animals in the treatment of disease.

Control of animal diseases.

American Journal of Surgery, 1932, n.s. 18, 349-357.

"...The demands for further investigation were never more pressing than they are today, and never before was there more interest in research. If the work should be checked, progress in animal husbandry would be doomed, and the problems associated with animal diseases (anthrax, contagious pleuropneumonia of cattle; glanders; rabies, or hydrophobia; swine diseases; Texas or southern cattle fever) would remain unsolved. The experience in this country would be like that in Great Britain, where, by parliamentary enactment, animal experimentation was so crippled that the country which should have done the most, by virtue of her wide geographic possessions and vast live stock interests, for improving methods of prevention and control of infectious diseases, has done very little. I quote from one of England's foremost veterinarians in a plea for animal experimentation:

'No country in Europe has, possibly, sustained greater loss during the last thirty-five years than our own; yet no country, perhaps, should have suffered less. With the finest breed of horses, and the most magnificent herds and flocks in the world, and a teeming population, whose health and wealth are largely centered in these, we have entirely neglected to protect them from the ravages of disease of home and foreign origin, by forgetting to foster and encourage that science which alone can accomplish this. That neglect has cost Great Britain and her colonies untold millions.'

Myers, J. A., Professor of Internal Medicine and Department of Preventive Medicine and Public Health, University of Minnesota, Minneapolis, Minnesota.

What experimental animals have contributed to our control of tuberculosis. American Journal of Surgery, 1932, n.s. 15, 382-388.

"...by the use of animals man has learned that:

- (1) Tuberculosis is a contagious disease.
- (2) Tuberculosis is caused by the tubercle bacillus.
- (3) Tuberculosis can be detected by animal inoculation.
- (4) Tuberculosis heals well under proper conditions.
- (5) Tuberculosis in some forms may be treated successfully by surgery.
- (6) Tuberculosis is preventable.

"To learn these facts and to have them scientifically established has required the use of many experimental animals. To the human family this has meant the saving of many thousands of lives, to say nothing of the suffering and sorrow it has prevented. ..."

Quick, Armand J., Associate Professor of Pharmacology, Marquette University School of Medicine, Milwaukee, Wis.

Is animal experimentation justifiable?

Bulletin of the Academy of Medicine of Cleveland, 1945, 30, 5-6, 16, 18.

Outlines purposes and ways in which animals are used in medical schools.

Reed, Carlos I., Professor, College of Medicine, University of Illinois, Chicago, Illinois.

Why is an antivivisectionist?

Illinois Medical Journal, Feb. 1935, 67, 134-142.

"... There now exists ample legal provision for the punishment of individuals for cruelty to animals. If the claims of these antivivisectionists are true, why then do they not resort to the legal provisions now available? Instead of attempting to prosecute individuals by means of the laws now available, they confine their activities entirely to agitation for new laws. It is quite obvious to any one who will review the facts dispassionately that both the claims of cruelty and the claims of mismanagement of the dog pound with relation to the disposition of pound dogs, are poorly camouflaged efforts on the part of these emotionally unstable individuals to impose restriction on scientific research solely because they themselves do not like it. ..."

"... If the antivivisectionist was willing to confine his activities and statements to facts, one might have more sympathy with him and be more willing to concede to him, at least a misguided, emotional motive; but when he deliberately distorts facts and misuses statements from disinterested parties in furtherance of

Reed, Carlos, I. (cont'd.)

his campaign, then we must conclude that the motive is an entirely selfish one. ...

"... In the last analysis, however, the public must choose whether it is desirable to have medical and dental students turned loose with less knowledge than the maximum that may be gained, or whether it is desirable to have these men trained more highly in each successive generation and given a maximum degree of efficiency in the practice of their profession. It is for the public to decide whether the misguided emotions of an uninformed minority are going to dominate the direction of the development of knowledge which may affect the entire population. ..."

Rogoff, J. M., Professor of Endocrinology, University of Pittsburgh,
Pittsburgh, Penna.

Contributions of animal experimentation to medical progress.
Endocrinology.

American Journal of Surgery, 1932, n.s. 16, 337-347.

An analysis of the experimental studies on the adrenal gland and a review
of some of the outstanding work on the thyroid gland.

"...since it is one of the most important organs in the body and so little is known concerning its function, it affords an excellent demonstration of the contributions that have been and are being made, in this branch of medicine, chiefly through animal experimentation. Progress is necessarily slow. Every contribution to our knowledge leads to new problems. The process of investigation must be continuous, extensive and cooperative; clinical observation and animal experimentation must be coordinated if the "Art" of healing is finally to find its proper place in civilization as a useful "Science."

Howell, Chester, LL.D., Berkeley, California.
Antivivisection.

California and Western Medicine, 1938, 49, 263-265.

(Reprinted from "World Comment" column of San Francisco Chronicle,
March 9, 1933)

"... That the real opposition is to science rather than to 'cruelty' is shown by the fact that these bills always authorize the infliction of pain on animals for other purposes, but prohibit scientific experiments even without pain. They all permit branding, dehorning, spaying and gelding on farms, without anesthetic, but forbid opening the vein of a mouse or a guinea pig in the laboratory, even under anesthesia. Most of them would prohibit feeding one rat on wheat and another on corn, to study the comparative processes of digestion. They permit the slaughtering of cattle for food and the poisoning of squirrels for protection, but they would forbid a pin-prick in a rabbit to measure the dose of insulin to save a human life. ...

"The fact is that medical research, mostly on animals, has already banished from the earth most of the plagues that once afflicted mankind and is on the way to control the others. Even George Washington and Louis XIV were pockmarked with smallpox. Now almost nobody has it. We no longer fear cholera, typhus, bubonic plague, or yellow fever. Malaria is under control; diphtheria preventable and curable; typhoid fever possible only by neglect; and most of the other contagious

Howell, Chester, LL.D. (cont'd.)

diseases dwindling. Tuberculosis is understood and has become a minor factor in the death rate. Influenza is still a mystery and cancer baffles us. ... Shall we make this pursuit of knowledge a crime?" ...

Torrey, Harry Beal, Stanford University and Children's Hospital
of the East Bay, California
Animal experimentation.
Scientific Monthly, Aug. 1939, 49, 160-166.

"In beginning my discussion of animal experimentation, I wish to give initial emphasis to the second word of our theme, not the first. For experimentation, being primarily a method of discovery, has not only been making extraordinary contributions to our knowledge and culture at a constantly increasing rate, but possesses certain properties of great interest quite apart from the materials the experimenter may select as most suitable for his problem. Experimentation with animals has the same general objective as experimentation with plants and with materials supplied by inorganic nature. The materials are of secondary importance. The problem is the focus of interest. ...

"Whatever our problems, and however near or far, we solve them adequately only with adequate techniques." ...

Wilmoth, Clifford Lee, Pittsburgh, Penna.
Animals' aid to science.
Hygeia, Dec. 1937, 15, 1088-1090.

"...The greatest single discovery in medical history leading to the alleviation of pain and mental suffering is that of anesthesia. Anesthesia was born, controlled and perfected through properly performed animal experimentation. Modern surgery, 'dedicated to the quest of knowledge that may relieve suffering and prolong life,' is a branch of medicine which could hardly have existed beyond the precincts of the barber shop, had it not been for animal experiments, especially those experiments which developed the science of bacteriology. ...

"To realize the advances of medical science aided by animal experimentation one has only to read and compare the medical history of the Civil and Spanish-American wars with that of the late World War. During the Civil War the mortality rate following abdominal wounds was greater than 90 per cent. Surgical knowledge was meager, and reasons for certain procedures were vague. Intestinal diseases, now known to be preventable, were rampant and took a larger toll of life than did wounds. In the Spanish-American War six times as many men died of typhoid as from all other causes. In the late World War, typhoid was almost unknown. This is the result of the application of knowledge made possible by discoveries in laboratories using animals for experimentation. ...

"A few there are who claim that such animal experiments are wrong. But we kill annually hundreds of thousands of sheep, cattle and hogs - not to prevent starvation but only to appease our appetites. We hunt and trap willingly and thoughtlessly, giving untold pain to thousands of wild animals. It is probable that the suffering among laboratory animals for the past century has not equaled that produced on the helpless animals of the wilds during the hunting seasons of the past twelve months. ..."

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Hygeia, Nov. 1928, 6, 618-622.

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Animal experimentation.
Hygeia, Aug. 1945, 23, 573.

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The ethics of vivisection.
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Animal experimentation: is it essential to the progress of medicine.
Life, October 24, 1938.

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An appeal to all citizens: to prevent further weakening of health laws
and hampering of research.
Hygeia, April, 1928, 6, 197-199.

The Medical Society of the County of Erie, Inc., and the
Buffalo Academy of Medicine

Anti-vivisection menace grows!
Erie County Medical Bulletin, July 1945, 22, 5-6.

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Published by the Society, 1933. 13p.

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Science, 1932, 76, 393-400.

Moon, V. H.

What price antivivisection?
Hygeia, Nov. 1932, 10, 999-1003.

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The role of experiments on animals in the treatment of disease.
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American Journal of Surgery, 1932, n.s. 18, 349-357.

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What experimental animals have contributed to our control of tuberculosis.
American Journal of Surgery, 1932, n.s. 15, 382-388.

ANIMAL EXPERIMENTATION

Appendix A

Why are dogs more adapted for
scientific experiments than other animals?

Appendix B

Contributions of the dog to the
advancement of science

Appendix C

Comments on animal experimentation in general

APPENDIX A

Why are Dogs more adapted for scientific experiments than other animals?

Citations from "Animal Experimentation: its importance and value to scientific medicine." Published by Board of Regents, American College of Surgeons, Chicago, Ill.

The continued use of dogs for experimental purposes is necessary for several reasons... First, their size renders it possible to perform operations and experiments that could not be performed on smaller animals. Second, the structure and function of most of their internal organs are identical with and react to drugs as those of man. Third, the dog is much better adapted to laboratory life than, for example, the pig. Fourth, in large cities, where medical schools and research institutes are found, dogs are wantonly but necessarily destroyed daily at the pound, while if they were humanely used in the research laboratories, their destruction would be of service to both man and animal kind.

*A.C. Ivy

Nathan Smith Davis Professor of Physiology and Pharmacology, Northwestern University Medical School, Chicago

No one wishes to experiment upon the dog. But the dog is more than man's friend. He is man's near neighbor physically. In his build, his diet, and the changes sickness produces in him he resembles man far more than do the other available creatures. Scientists could not have found out about some diseases, human and animal, had he not been experimented upon; nor can they do so in the future without him.

Peyton Rous

The Rockefeller Institute
for Medical Research, New York

* See also in British Medical Journal, July 7, 1945, 2, 26-27, a letter on "Teaching of physiology," by R.A. Gregory, Department of Physiology, University of Liverpool, in which he states "My own appreciation of the extent to which the teaching of physiology in this country [England] is obstructed by the obsolete restrictions to which I refer is increased by my recollections of the methods of teaching practical physiology to medical students that I was privileged to observe in 1939 in the medical school of Northwestern University, Chicago, Ill., U.S., under the direction of Prof. A.C. Ivy." Excerpts from this letter are given on page 4-5 of this Appendix.

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Appendix A

5.1

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In order to do successful surgery, not only must the mechanical technique of an operation be mastered, but the surgeon should know the physiologic function of the tissues with which he is dealing in order to preserve or readjust the function.

If a child has an obstruction of the bowel, or a man a strangulated hernia, or a wound in the stomach or intestine the problem of immediate surgical relief at once arises, probably removing a portion of the intestine and sewing the ends together. No one can learn to do this solely by reading about it, or by hearing someone tell about it, or even by seeing someone else do it... No matter how carefully the work may be done on the dead tissue of a cadaver, there is nothing that substitutes for living tissue. The result of the experiment can be ascertained only by observing the animal after the operation.

The surgeon, then, is reduced to the choice of learning how to repair injured bowel on the lower animals, or of acquiring skill by his experience on human beings. If an experimental operation is done on an animal and the animal dies a postmortem examination is made to determine the cause of death. If the animal recovers it is killed under anaesthesia after a number of days and the site of the operation is studied. In this way the technique of the operation of suturing the intestines may be so improved that the surgeon can, with confidence, undertake this operation on a human being.

It is well known that the mortality rate in the first series of experimental operations on animals is higher than it is later on after the operator has become more skillful. If he is denied the opportunity of acquiring this skill by experimental operations on the lower animals, he must obtain it by clinical experience on human beings, and many lives will be needlessly sacrificed before the necessary training is obtained. This, of course, is only one feature of the benefits of animal experimentation, but it is very practical and striking.

Dogs eat about the same food and have somewhat the same habitat as man, and often make the best subjects for many of these experiments. The stray dogs that are gathered in a pound and killed help no one. If these animals are properly taken care of in a laboratory, operated upon painlessly, and painlessly killed, they are of great use to humanity. ...

J. Shelton Horsley
St. Elizabeth's Hospital,
Richmond, Virginia

Nature has seen fit to afflict laboratory animals with many forms of cancer strikingly like those which occur in human beings. Nature has also given to such animals a far shorter life span than our own so that they attain the various "ages" at which certain types of cancer most commonly occur, in a few months or years - instead of in several decades as we do.

These facts have combined to make laboratory mammals an effective "short-hand" material for the purpose of research in cancer.

In view of the appalling death rate from cancer and because of its widespread incidence, research must not be hampered. The nature of cancer is such as to place almost staggering difficulties in the way of its analysis and control. Restrictive legislation of any sort concerning the use of animal material will definitely diminish and may finally preclude the chances of the conquest of this disease.

Clarence Cook Little
Managing Director, American
Society for the Control of
Cancer, New York

Letter on "Teaching of Physiology," by R.A. Gregory, Department of Physiology, University of Liverpool, in British Medical Journal, July 7, 1945, 2, 26-27.

" ...

"Use of animals by medical students. - ...Students are forbidden by law to experiment on any vertebrate animal except one which has been decerebrated by a demonstrator; the use of anaesthetized animals - even rats - is not allowed. ...Relaxation of the law in this respect would render superfluous many animal demonstrations; but there would still remain a large number for which the use of an unanaesthetized animal, previously prepared by feeding, aseptic surgery, or training, is essential - e.g., many demonstrations on the functions of the nervous system, digestion, absorption, the semicircular canals, and the reproductive organs ...

"Such demonstrations cannot be shown to students in this country because no experiment may be performed on an animal for demonstration purposes unless it is anaesthetized throughout and is killed before it recovers consciousness (Certificate C). Moreover, since such experiments may not be demonstrated, it follows that no films can be made of them ...

"Supply of cats and dogs for teaching and research. - Even supposing the present restrictions upon the use of animals for medical teaching and research were removed or modified, there would still remain a further difficulty which bids fair to become the most serious of all - namely, the supply of cats and dogs for these purposes. I doubt whether any teaching school in the country is able at the present time to count upon a regular supply of six cats and dogs per week. Our dwindling supplies of these vital necessities for research and teaching are obtained from private animal dealers; we are entirely at their mercy in the matter of prices, which are steadily rising (cats now cost 6s. to 7s. each and dogs from 12s.6d. to £2). In this city alone last year more than 30,000 stray cats were destroyed in the lethal chamber by the R.S.P.C.A.; and the use of stray dogs for experimental purposes is forbidden by law.

"My own appreciation of the extent to which the teaching of physiology in this country [England] is obstructed by the obsolete restrictions to which I refer is increased by my recollections of the methods of teaching practical physiology to medical students that I was privileged to observe in 1939 in the medical school of Northwestern University, Chicago, Ill., U.S., under the direction of Prof. A.C. Ivy. An ample supply of stray dogs was made available by the city authorities for medical teaching and research; and the well-balanced and extensive course of practical instruction provided for pre-clinical students included the performance on anaesthetized dogs, by students working in groups of four (operator, assistant, anaesthetist, and clerk) of a considerable number of experiments on the circulation, respiration, digestion, absorption, excretion, lymph-flow, etc. In addition each group performed at some time towards the end of their course an aseptic operation on an anaesthetized dog (splenectomy) and were responsible for the after-care of the animal. The class also witnessed demonstrations on unanaesthetized dogs provided with gastric pouches and similar preparations which were being used in the department for research.

"These students went on to their clinical work not only with an extensive practical experience of mammalian physiology and the techniques employed, many of which are, of course, common to medicine and surgery, but they carried with them also an abiding appreciation of the experimental method as an approach to clinical problems; and a surprising proportion of them returned during and after their hospital training, on their own initiative to do research - often of very high standard - upon problems directly related to their clinical work.

"We all want to see the standard of physiology teaching to medical students raised higher in this country than anywhere else in the world, but we might as well admit that we are at present a long way from this ideal, and shall remain so while we are prevented from giving to medical students that practical experimental experience in physiology which they ought to have, and which, indeed, they may now receive abroad, if they are to assimilate the enormous mass of facts with which they must deal."

Dogs are indispensable for certain types of experiment. They will eat both animal and vegetable food and thus, more than any other available animal, live upon the same diet as man. They are large enough to permit surgical experiments under the structural conditions found in man, and live comfortably in surroundings necessary for most scientific observations.

Walter B. Cannon

Cecil K. Drinker

"The Dog's Gift to the Relief
of Suffering."

New England Journal
of Medicine.

1932, 207, 489-494.

"Many reasons have made it necessary, and will always make it necessary, to use dogs instead of other animals for some of this experimental work. Considerations of size are important, and in this respect the only animals giving a practicable alternative are the sheep, the pig, the goat or the ape. The dog, unlike these animals, can be kept completely healthy and comfortable in the laboratory and in near association with man. There is no ground whatever for the assertion, commonly made, that the dog has some special sensitivity to discomfort or pain beyond that of other wild or domestic animals.

"It may, indeed, be urged that owing to the reasons given in favour of the use of dogs, and on the general humane grounds of avoiding discomfort to animals when in captivity, or when receiving an anaesthetic for painless experiment, or when under observation, the dog's special habituation to man makes it more, rather than less, desirable to prefer the use of the dog to that of wild or less domesticated animals when the nature of the experiment requires or allows it. Experimental work with animals can, however, in most instances, attain its aims in the acquisition of new knowledge by the use of smaller animals, and actually the dog is used in a very small minority among other animals. It is plain that the selection of the animal most fitted for the special purpose in view must be left to the discretion and skilled knowledge of the worker in medical science."

Great Britain. Medical Research
Council.

"Fight Against Disease,"
1937, 25, No.1; published
by Research Defence Society,
London.

RESEARCH DEFENCE SOCIETY

Cavendish Square
London, W.1.

Why Dogs are Essential for Medical Research

By Professor E.H. Starling ...
Foulerton Professor of the Royal Society

The prevention and cure of disease is only possible by means of an accurate knowledge of the functions of the body, and there is hardly any fundamental truth with regard to the workings of the body which has not been established by experiments on dogs. The action of the heart and its nerves, the circulation of the blood, the nature of respiration, the process of digestion, the chemical changes the food undergoes in the body, the functions of the kidneys and of the liver, and the action of the internal secretory glands, have all been revealed by such experiments. And, although corroborative experiments have been carried out since on other animals, these would have been in many cases impossible if the principles had not first been established by the use of dogs. If these animals had been excluded from experiment, few of these facts would have been found out, nor would the knowledge and power gained thereby have been applied for the benefit of man.

Why is the use of dogs so essential in Medical Research? No one will dispute that, to gain a knowledge of living functions, recourse must be had to living animals, and those animals must be such as can be kept in comfort and health within the precincts of a laboratory. The ordinary farm animals are therefore excluded by this fact alone. But a more fundamental objection to their use, so far as information to be gained from experiments on them is concerned, arises from the wide differences which exist between the structure, functions and habits of their digestive organs and those of man.

For a vast number of experiments, viz: - the greater part of those necessary in research on infective disease, the smaller animals - mice, rats, guinea pigs and rabbits - can be employed. In these experiments it is chiefly necessary to decide whether the injection of a given organism or microbial poison is followed by death or survival. That is their purpose and use, and both are limited. As soon as it becomes necessary to analyse the processes occurring in separate organs, e.g., the heart, the kidney, etc., it is essential to make use of larger animals, and the limitations mentioned confine these to dogs and cats. Cats are used wherever possible. But the delicacy of their tissues, the small size of their organs, and the marked differences which exist between their food habits and those of man render it necessary to employ the dog for many important lines of research. Thus it comes about that the greater part of our knowledge of the heart's action, of the production of lymph and the causation of dropsy, of the nature of diabetes, and of the fate of different kinds of food in the body is owing to experiments on dogs, and would not have been discovered if the use of dogs had been prohibited.

If the Bill, prohibiting the use of dogs, is allowed to become Law, all research in this country into such problems as the causes and treatment of diabetes, of Bright's disease, of heart disease and dropsy, of disorders

of the stomach and intestines, of the diseases of dogs themselves, such as distemper, and many others will be hampered to such an extent that progress in our knowledge will come to an end, except insofar as it can be slowly and painfully attained by observations and experiments on human patients themselves.

The prohibitions of the Bill would be equally disastrous for the progress of Surgery. The fundamental advances made during the last twenty-five years, which have proved of such inestimable value not only in civil practice, but also during the War, in the treatment of our wounded soldiers, were achieved in the first instance by means of experiments on dogs. By such experiments it was first shown to be possible to excise portions of the alimentary canal, to make openings from one part to the other in order to relieve obstruction, to remove part or the whole of internal organs, to implant bone and tissues so as to restore defects, to deal fearlessly with the cavity of the chest, to sew up wounds in the living and beating heart, to restore continuity of wounded blood vessels, and to operate with success on the brain itself.

Though the advances in medicine of recent years have been so marked, much remains to be discovered. Much more remains to be achieved in order to abolish or alleviate even a fraction of the pain and suffering which is all around us. But all activity in this direction would be hampered, and much of it brought to a standstill, if the Bill were allowed to become Law.

APPENDIX B

Contributions of the dog to the advancement of science

No one acquainted with the advance of medical science would want progress to stop. The fruits of scientific effort can, however, be tragically and needlessly delayed. If Richard Martin, more than a century ago, had been successful in his campaign to prohibit Magendie's experiments, the loss to succeeding generations would have been incalculable.

Harvey had used dogs in showing the double nature of the circulation but his work was isolated in time. Magendie and Bernard, on the other hand, founded modern physiology and pharmacology. Magendie's greatest contribution was proof that the posterior nerves are sensory and the anterior motor. This was demonstrated in dogs. Bernard's proof of hepatic glycogenesis was based on dog experiments.

Other animals are used in much greater numbers than dogs but the anti-vivisectionists are chiefly concerned at present about the dog and it is therefore well to review the importance of that animal to medical science so that we may all be well acquainted with the facts.

Physiology and pharmacology were not only founded on dog experimentation, they are still dependent on it. The same may be said of modern surgery. The dog is the only animal of sufficient size whose organs and functions lend themselves to surgical technic. The young surgeon makes his awkward beginnings and the expert develops and tests new methods on the dog. When Pasteur gave us bacteriology and Lister antiseptic surgery the bars were down on a new world of curative medicine. Could the abdomen be opened? Could the stomach and bowel be cut, tumors removed, gun-shot wounds repaired? Dogs were used to answer these questions. How sew organs together? What kind of suture should be used - catgut, silk, or linen? The trials were made on dogs. During the Civil War abdominal wounds were left to Nature and 90 per cent of all those with such wounds died. Dog surgery showed that repair was possible and the mortality was halved. It has now been reduced to less than 10 per cent.

Kidney surgery began when Simon removed the kidney of a woman who had one ureter discharging on her abdomen. No one knew whether it was compatible with life to remove one kidney; much less how to do it. Simon sought answers to both questions in dogs and then cured his patient.

Chest surgery is rapidly becoming as safe as abdominal surgery, thanks to the dog. The original obstacle was a means of maintaining respiration when the chest was opened. Meltzer and Auer, and Sauerbruch and Meyer were pioneers who showed how this could be done. Their investigations were done on dogs. Cancer and tuberculosis of the lung, cancer and diverticula of the esophagus, and lesions of other thoracic organs are now being treated surgically because of their work. The method has been especially valuable during the war when chest wounds were common. The possibility of transplanting parts, so important to many a mutilated soldier, was first shown in dogs.

During the first World War empyema, following influenza, was a new and serious problem. One third of the patients died. The development of treatment was based on dog tests. How large an opening could be made to drain the pleura? When could the operation be most safely undertaken? What to irrigate with? Dogs supplied the answers.

Harvey Cushing has testified that knowledge of ways to operate on the pituitary gland was derived from experiments on dogs and that every patient operated on for pituitary disease, and thereby possibly saved from a life of blindness, may thank the dog for this blessing. Dandy's studies of hydrocephalus depended on the availability of dogs. Indeed brain surgery and advances in physiology would have been impossible but for the dog.

The role of the thyroid and of thyroid deficiency during gestation were studied in dogs and the prevention of goiter by iodine was based on dog studies. Similarly the relations between tetany, the parathyroids, and pregnancy were learned through dog experiments, including the life-saving effects of Klinger's solution and parathyroid hormone.

Can a pregnant woman be safely given X-ray treatments? During which stages of pregnancy and how much? What harm does X-ray cause the fetus? Are the ovaries permanently affected and will children born in later years be normal? All these questions have been answered by studying dogs.

The heart is beginning to yield to the surgeon because Allen perfected methods of heart surgery on dogs.

Our basic knowledge of kidney function stems from dog studies. Cushny measured the function of the different zones of the nephron of dogs. Goldblatt showed the effect of ischaemia by dog experiments, the beginning of modern knowledge of hypertension.

That the dog will be as necessary tomorrow as yesterday is shown by the record of today. It was only this year, 1945, that, through dog experiments, it was learned that penicillin preserves life in intestinal obstruction. The prospect of removing cancer from the pancreas and yet preserving the remaining organ is brighter because of technical methods being developed in dogs. The cause of trench foot has been studied in dogs, and shock has been almost exclusively studied in dogs. What we know of the prevention of shock and the use of transfusions would have been impossible without the dog. Who can count the lives that knowledge has saved?

Would any group have conceivably prohibited the dog studies which led to insulin? The experimental diabetics used were dogs and the first successfully treated diabetic was a laboratory dog. At that time diabetic children lived at the most one or two years. Now they can be kept in robust health for decades. There are a million diabetics and individuals who will become diabetic, in this country. Yet at one time, after insulin was discovered its use seemed impractical because of its toxicity. Dr. MacLeod had seen pictures of hypoglycemia in dogs and the curative effect of glucose. He suggested the "toxicity" might be simply hypoglycemia and so it proved to be. The theoretical dog studies of Mann saved the day.

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Appendix B

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Whipple's studies of experimental anemia in the dog were of similar importance and led, as you know, to the discovery of the life-saving power of liver extract in Addisonian anemia.

The value of the dog in pharmacology is very great. Adrenalin must be standardized in the dog. Ethylene was considered poisonous because of its effects on plants until dog studies showed that combined with oxygen it provided our safest and most agreeable anesthetic. The use of many common and necessary drugs, chloral, acetanilid, strophanthus, amyl nitrate, and thyroid extract is based on animal experiments.

Charles Stockard gained important knowledge of genetics through dog experiments.

The importance of animals in the development of bacteriology and the control of infectious diseases is well known and has to a great extent been conducted in animals smaller than dogs. Yet we would be greatly handicapped without the dog. So would the dog. The problems of contagion are important to all species.

Consider distemper, now preventable. It is the dog's commonest infectious disease and a frequent cause of death. Dunkin and Laidlaw, who taught us most of what we know about distemper, simultaneously provided the method which first opened the subject of human influenza for experimental study. They benefited man and dog.

The protection of the dog against rabies could only have been accomplished by using him as an experimental subject and improvements in present preparations will be impossible if dog experimentation is prohibited.

Goldberger was only able to study pellagra experimentally because the dog is susceptible to it. What a gain for both man and dog! When nicotinic acid was suggested as a cure for pellagra the proof was sought in the dog for the dog is the only animal which has a disease nearly enough identical to human pellagra.

Edward Mellanby learned that puppies fed milk and bread became rachitic. He tested a popular proprietary which was reputed to cure rickets, an emulsion of linseed oil. It was worthless. But his attention had been attracted to fats and he tried others including cod liver oil. Thus we learned to prevent and cure rickets. Alfred Hess relied on dogs for many of his dietary experiments.

We know that some dogs on Long Island are infected with spotted fever. Shall we not learn more about it? This, like influenza, is an instance in which more than one species have a common enemy and all must contribute so that knowledge may be gained. Indeed the dog may be more closely involved in human diseases than we yet know. The recent demonstration of neutralizing antibodies for poliomyelitis in dog sera suggests this.

It has been said that the anti-vivisectionists speak for animals while we speak for man. But we speak for both the animals and man. The control of such important animal diseases as foot and mouth disease, influenza,

anthrax, hog cholera, swine erysipelas, and pleuro-pneumonia are also at stake. We have learned to destroy the dog's hookworm, prevent his rabies, distemper, and pellagra, and are probably about to cure his heart worm. So the dog has benefited, too. As William Mayo said: "To remove dogs and other animals from the purposes of experimental medicine would be a calamity not only to mankind but to the lower animals themselves."

10/10/45

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APPENDIX C

Comments on animal experimentation in general

From an Editorial by Herman Kretschmer, President of the American Medical Association. Hygeia, 1945, 23, 573.

"What are some of the benefits of animal experimentation to mankind and animals?

1. Animal experimentation has made it possible to develop the entire field of physiology on a sound foundation, both in health and disease, so that we have a better understanding of every organ in the body.
2. Advances in surgical technic have been made possible by animal experimentation. Surgical operations on the intestines, nerves, tendons and blood vessels, transplantations of bone, cartilage and entire organs are the result of animal experimentation.
3. The standardization of various drugs is directly dependent on the use of animals. New remedies, such as the various sulfa compounds and penicillin, are tested out on animals to determine their potency, their actions and effects.
4. Animals are needed to standardize the vaccines, antitoxins and serums that are used in the prevention and treatment of infectious diseases such as diphtheria, yellow fever, cholera, typhoid and many others.
5. I should like to mention some of the advantages that have accrued to animals: Animals have been protected by vaccination for rabies, for horse encephalitis, distemper, bovine tuberculosis, hog cholera, foot and mouth disease, hookworm disease and many others.
6. The role of bacteria in the cause of infectious diseases and the methods of preventing these diseases have been the result of animal experimentation. As a result many years have been added to man's life span.
7. Surgical sepsis and antisepsis. If we had not discovered on animals what bacteria did when they entered the body, which discovery led to the practice of sterilizing all materials used in an operating room, our operative mortality would still be high in spite of good surgical technics.
8. Our knowledge of the role that vitamins and hormones play in our life was enhanced by animal investigations.
9. The study of infantile paralysis with its many crippling after-effects requires the use of animals to further research in this field. The monkey has been invaluable in study of the various phases of this dreadful disease.
10. Experiments on animals, particularly mice, have added to our knowledge of cancer and other malignant tumors.
11. Monkeys, dogs, rats and chickens have been used to study malaria and antimalarial drugs.

12. Without the use of animals many of the splendid results achieved in the treatment of casualties in this war would not have been possible. Many of these problems were first studied in animals, including the treatment of burns, the effects of gas poisoning and the treatment of shock.

13. Great progress has been made in the field of anesthesiology, most of it based on animal experimentation. ... As a result of this work, ethylene as an anesthetic agent was put on a firm basis."

From "Animal experimentation in biology and medicine,"
by Professor A.J. Carlson, University of Chicago.
Science, 1938, 88, 245-250.

"...Free and intelligent experiments on animals during the last three hundred years have been the greatest factor in our present achievements in knowledge of the nature of life and control of disease. ...

"...Experimentation on animals is essential for the practical application of a great deal of present medical knowledge in the prevention or cure of disease. Animals produce antitoxins for us; they are essential in the discovery and standardizing of new remedies. They are necessary for the diagnosis of some forms of tuberculosis. They are of great service in some aspects of human pregnancy. The modern story of foods, nutrition and the known disorders of nutrition would be largely gaps and guesses, except for the services of the rat, the pigeon and the dog. ...

"...Animal experimentation seems essential for further progress in biology and medicine. ... After more than a third of a century's service in biology, it seems clear to me that intelligent and humane use of all species of animals will be necessary on the road to a fuller understanding and control of heredity, growth, cancer, immunity, colds, pneumonia, nervous, glandular, nutritional and mental disorders.

"Furthermore, the use of animals is of continuous and increasing importance in the training of the doctor and the biologist of the future. ... If the society of to-morrow needs the services of doctors and biologists, common sense seems to say that their training is a matter of importance, a training in nature as well as in books. That means, we need animals in the training of doctors and biologists, and animals can be so used, and are so used, without cruelty.

"...Animal experimentation is humane. ...in animal experiments involving pain the same anesthetics are used as in surgical operations on man. ...

"Biological and medical investigation and teaching, guided by the humane behavior of the sane and civilized man, must remain free, must not be restricted, lest we condemn our children to dreary decades of medical stagnation. ..."

13. Without the use of animals many of the splendid results achieved in the treatment of cancer in this war would not have been possible. Many of these problems were first studied in animals, including the treatment of burns, the effects of gas poisoning and the treatment of shock.

14. Great progress has been made in the field of anesthesiology, most of it based on animal experimentation. The work of this work, especially as an anesthetic agent has been a fine example.

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"...Free and intelligent experiments on animals during the last three hundred years have been the greatest factor in our present advancement in knowledge of the nature of life and control of disease. ...

"...Experimentation on animals is essential for the practical application of a great deal of present medical knowledge in the prevention of disease. Animals produce similar reactions to those which are essential in the discovery and standardizing of new drugs. They are necessary for the diagnosis of some forms of tuberculosis. They are of great service in tests of human pregnancy. The modern study of food, nutrition and the known characters of nutrition would be impossible without the use of animals for the control of the test, the preparation of the food, and the analysis of the results.

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"Furthermore, the use of animals in experiments and investigations is of importance in the training of the doctor and the biologist of the future. If the society of tomorrow needs the services of doctors and biologists, a common sense seems to say that their training in a matter of importance, a training in nature as well as in books. That means, we need animals in the training of doctors and biologists, and animals can be so used, and are so used, without cruelty.

"...Animal experimentation is essential in animal experiments in which the same anesthetics are used as in surgical operations on man. ...

"Physiology and medical investigation and teaching, guided by the human behavior of the same and civilized and, most recently, by the use of animals, is essential for the control of disease and the prevention of disease.